(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 920 178 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
02.06.1999 Bulletin 1999/22

(51) Int. Cl.[6]: H04M 15/00

(21) Application number: 98309513.4

(22) Date of filing: 20.11.1998

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: 26.11.1997 US 979157

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(54) Monitoring charges for network services

(57) The present invention provides for real-time monitoring of charges for using a communication network service, thereby enabling a user to continuously know the charges incurred during each usage. The user also is able to define a charge limit prior to using the service and the usage terminates automatically when the accumulated charge reaches that limit. This approach is particularly suited to monitoring charges associated with a telephone conference call.

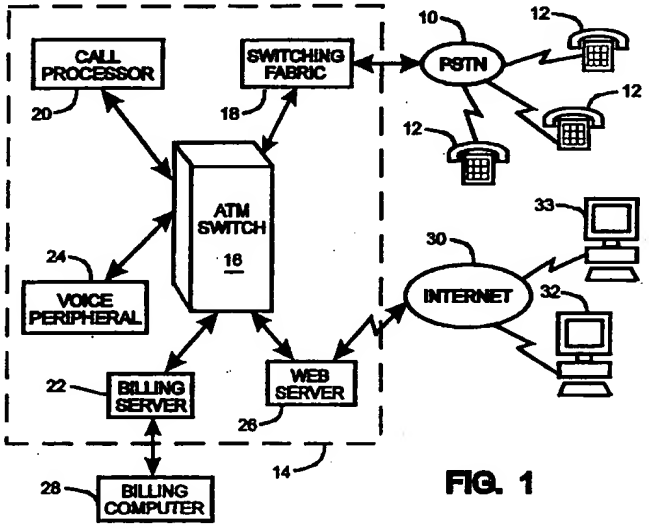

FIG. 1

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Description

[0001] The present invention relates to monitoring charges for a service provided by a communication network, for example a telephone conference call.

[0002] Over the past few years, the number of new services and features offered over telephone networks has grown. These enhanced telephone networks are knows as "Advanced Intelligent Networks" (AINs). Telephone control networks conforming to AIN architecture contain intelligent subsystems for controlling switched traffic and user services such as conference calls, call waiting, call forwarding, voice announcements, voice response, keyboard response, etc. These intelligent subsystems, called "Intelligent Peripherals" (IPs), are configured for specific regional calling services.

[0003] Multi-processor systems used as an AIN system are disclosed in patent application number 08/792,018 by Deborah L. Acker and Thomas E. Creamer, which is assigned to International Business Machines (IBM), a copy of which is placed on the file of the present application, and which is hereby incorporated by reference.

[0004] For a conference call, the host caller instructs the intelligent peripheral to connect each conference participant. A telephone switch then establishes a separate leg of the conference by calling each participant and connecting together the telephone line for each leg. A given leg may be a local or a long distance call. Billing is based on a per minute rate for each leg of the call and the rate is typically higher than a rate for a two party call along the same leg. Thus, different rates usually apply to each leg of the conference call. It is apparent that the charges accumulate at a rapid rate when there are a number of parties connected by legs to which long distance toll charges apply. Therefore, it is desirable for one or more conference participants to be able to monitor the accumulated charges for a conference call on a real-time basis while the call is taking place. However, real-time monitoring of conference call charges is further complicated by participants joining and dropping from the call at different times.

[0005] It may be desirable to place a monetary limit on the total charges for the conference call so that the call does not exceed a budgeted amount. Limiting the call duration in this manner can help the participants to adhere to an agenda for the call and not be verbose.

[0006] It is customary that telephone and other types of network services are billed on a periodic, e.g. monthly, basis. A bill for a given call is not issued until the end of the billing cycle in which the call occurred and then the customer has several weeks to make payment. It may be advantageous (particularly for the network provider) to bill and receive payment for service as soon after delivery as possible. Thus it is desirable, immediately after the completion of the call, to automatically submit a bill for a particular service to a credit or debit account maintained by a third party service provider, such as a bank credit card operation.

[0007] Accordingly, the invention provides a method of monitoring charges for a service provided by a communication network comprising the steps of:

detecting occurrences of billing events which occur during use of the service;

when a billing event occurs, adding a charge fee associated with the event to a cumulative charge total for the service;

occasionally transmitting the cumulative charge total via the Internet to a device located with a person using the service; and

displaying the cumulative charge total received from the Internet to the person while the service is being used.

[0008] In a preferred embodiment, the method further comprises the steps of: storing a limit on the total charge for the service as defined by a user of the service; and terminating further use of the service when the cumulative charge total reaches the limit on the total charge. It is also advantageous if, at the completion of a usage of the service, a provider of the communication network can send the cumulative charge total to one of a credit card account, a debit account or an electronic commerce system (generally operated by other than the service provider).

[0009] Typically the step of detecting occurrences of billing events comprises detecting each time a predetermined period of time elapses during use of the service.

[0010] In one preferred embodiment, the service is a conference call service, and the step of adding a charge fee comprises, for each communication line connected to a conference call, adding the charge fee associated with a given communication line to the cumulative charge total every X seconds while that given communication line is connected to the conference call, where X is a positive number.

[0011] In another preferred embodiment, the service is a conference call service which interconnects several communication lines, and the step of adding a charge fee comprises adding a charge fee associated with a given communication line to a running subtotal for that given communication line every X seconds while that given communication line is connected to a conference call, where X is a positive number; and producing the cumulative charge total by a summation of the subtotal for each communication line.

[0012] It is preferred that the method further comprises the steps of transmitting the subtotal for each communication line via the Internet to the device located with a person using the service; and displaying the subtotal for each communication line to the person while the service is being used.

[0013] Note that in such situations where the service provides a conference call involving a plurality of participants, it is preferred that the method further comprises:

periodically transmitting, via the Internet to the device located with a person using the service, an indication of whether each participant is connected to the conference call; and

displaying each indication to the person while the service is being used.

[0014] The invention further provides a system for monitoring charges for a service provided by a communication network comprising:

means for detecting occurrences of billing events which occur during use of the service;

means responsive to a billing event for adding a charge fee associated with the event to a cumulative charge total for the service;

means for transmitting the cumulative charge total via the Internet to a device located with a person using the service; and

means for displaying the cumulative charge total received from the Internet to the person while the service is being used.

[0015] Viewed from another aspect, the invention also provides a method of billing for a conference call involving an interconnection of a plurality of communication lines, which method comprises steps of:

for each communication line in response to an occurrence of a predefined billing event while that communication line is connected to the conference call, adding a charge fee associated with the billing event to a cumulative charge total for the conference call;

occasionally transmitting the cumulative charge total via the Internet to a device located with a participant in the conference call; and

displaying the cumulative charge total received from the Internet to the participant during the conference call.

[0016] The approach described herein permits real-time billing of advanced intelligent network (AIN) services, and allows the user of advanced network services to monitor the service charges which are accumulating during service use. In particular, a user at the commencement of service may place a monetary limit on the total charge for that particular usage and have that usage terminate automatically when that limit is reached. The billing of the enhanced network service may be achieved automatically to a credit or debit account following each use.

[0017] Thus the preferred embodiment finds particular application in telephone billing systems for central office switches that provide advanced intelligent network operations and services, and offers a method of monitoring charges for a service provided by the advanced intelligent communication network wherein the method detects occurrences of billing events which take place during use of the service. When a billing event occurs, a charge fee associated with the event is added to a cumulative charge total for the service. The cumulative charge total is occasionally transmitted via the Internet to a device located with a person using the service. For example the transmission occurs whenever the cumulative charge total changes. The device displays the cumulative charge total received from the Internet to the person while the service is being used.

[0018] In this manner the running costs of the service are continuously being tracked and displayed to the person during usage of the service. This enables a user to know at any given point in time how much the current use of the service has cost.

[0019] Preferably the user is allowed to define a maximum cost limit for a particular use of the service. When the cumulative charge total reaches that maximum cost limit, the use of the service automatically terminates.

[0020] This approach has particular application to telephone conference call services. Here a running subtotal of the charges for each telephone line connected to the conference can be maintained even where different usage rates apply to each telephone line and where telephone lines are connected to and disconnected from the conference at different points in time. The per line subtotals may also be sent and displayed to the conference participant.

[0021] A preferred embodiment of the invention will now be described in detail by way of example only with reference to the following drawings:

FIGURE 1 is a functional block diagram of a telephone network which conforms to the AIN architecture; and

FIGURE 2 is a flow chart of a process implemented on the network for real-time billing of extended telephone services.

[0022] With initial reference to Figure 1 a public switched telephone network (PSTN) 10 conforms to the architecture for an advanced intelligent network (AIN). Further information about the AIN architecture can be obtained by referring to one or more of the following published documents, whose teachings are incorporated herein by reference:

Bellcore, GR-2802-CORE, Advanced Intelligent

Network (AIN) 0.X Issue 1, Generic Requirements, Issue 2, December 1993. Bellcore, GR-1129-CORE, Advanced Intelligent Network (AIN) 0.2 Switch Intelligent Peripheral Interface (IPI) Generic Requirements, ILC 1E, November 1994.

A plurality of telephones 12 are connected to local lines of the PSTN. It is understood that some of these connections may involve long distance connections within the PSTN.

[0023] Also connected to the PSTN 10 is an intelligent peripheral 14 which provides switched connections for telephone calls passing through a regional node of the PSTN (e.g. between local and trunk lines traversing the node), and which controls service applications associated with the respective calls. These service applications typically include enhanced voice services, such as multiple party conferencing, voice announcements, speech recognition, call waiting, and call forwarding.

[0024] The hardware of the intelligent peripheral 14 in the preferred embodiment includes a "switch fabric" complex 18, a call processor 20, a billing server 22 and voice peripheral processor 24. Critical components such as the voice peripheral processor 24 and call processor 20 are configured redundantly to ensure continuous availability in case of any component failure. Voice and data connections among the components of the intelligent peripheral 14 are provided by a local area network, commonly implemented via an asynchronous transfer mode (ATM) switch 16.

[0025] The intelligent peripheral 14 is coupled to the PSTN 10 by the "switching fabric" complex 18, which is a conventional telephone switch that interconnects lines of the PSTN 10 to establish a two-party telephone call or a conference call involving the interconnection of a greater number of PSTN lines. The call processor 20 implements a call model which defines the procedure when a call comes into the switching fabric 18, with the switching fabric 18 providing the physical connection of the PSTN lines to form the conference call. The billing server 22 utilizes a set of custom application programming interfaces (APIs). When billing is initiated for a particular service, the billing server 22 receives the identification of the service provided, the telephone numbers involved in the service and the originating line number. The APIs sequence consists of opening the billing process, populating the billing elements with the appropriate billing information, such as the date of the transaction, connect time of the transaction, disconnect time of the transaction, originating telephone number, the terminating telephone number or numbers, type of service, billing type, billing rates, and cumulative charge amount. The billing server 22 provides the appropriate billing data on a per transaction per subscriber basis. The billing can be designed on a time duration of usage or a per usage basis. Once the API closes the billing process for a given service transaction, the raw billing data is composed into an acceptable format and sent to the billing computer system 28 for the network service provider.

[0026] Another component of the intelligent peripheral 14 is the voice peripheral processor 24 which provides digitally stored audio messages or digitally synthesized voice messages which provide information to the caller regarding the status. For example, these messages state that the caller has reached a non-working number, or prompt the user to enter commands via a telephone keypad to select service functions.

[0027] In accordance with the present invention, the standard intelligent peripheral 14 has been enhanced with the addition of a conventional web server 26 to interface the intelligent peripheral to the Internet 30. This allows personal computers 32 and 33 connected to the Internet to access the intelligent peripheral 14 to set up different enhanced voice services. For example, a customer can set up a conference call via the Internet and during the call receive real-time billing information on a personal computer 32.

[0028] The software for implementing the billing process is stored within the components of the intelligent peripheral 14. The present billing technique is best understood in the context of an automated conference call, one that is established and managed without requiring intervention by a human operator. Nevertheless, one skilled in the art will understand and appreciate that analogous billing techniques can be applied to other forms of enhanced voice service, and even other types of communication networks than just telephone systems.

[0029] Referring now to Figure 2, a conference call commences at step 40 by a host of the conference call, hereinafter referred to as the "host caller", accessing the intelligent peripheral 14 to set up the conference call. This pre-registration of the conference call may take place either at the beginning of the call or some greater time prior to the call, for example at a point when all of the participants have agreed to be available at a given time. The host caller can perform the pre-registration either by accessing the intelligent peripheral 14 by one of the telephones 12 or from a personal computer 32 via the Internet 30. In the case of accessing the intelligent peripheral via a telephone 12, the host caller typically dials an "800" (a FreePhone or toll-free) telephone number assigned for this purpose. The incoming telephone call initiates a procedure in which the voice peripheral processor 24 issues step by step voice prompts to the host caller requesting information regarding the time of the call and telephone numbers for each of the call participants. The host caller enters the requested information via the telephone keypad. Similar access of the intelligent peripheral 14 via the Internet and the IP web server 26 causes the web server to send the host caller's personal computer 32 a series of display screens on which the host caller enters the necessary information for establishing a conference call. Other types of enhanced voice services may be initiated

in the same manner, either via a telephone or the Internet connection. The information that the host caller provides to the intelligent peripheral 14 is stored in the call processor 20 until it is time to commence the conference call.

[0030] The conference call may be commenced automatically by the intelligent peripheral 14 or upon the host caller accessing the intelligent peripheral again. If during pre-registration, automatic commencement was indicated, the intelligent peripheral, and specifically the call processor 20 will initiate the conference call at the designated date and time. In this instance, the call processor 20 will call each of the participants via the switching fabric 18 and as each telephone call is answered, the voice peripheral processor 24 transmits an audio message informing the participant that this is the conference call. Then the switching fabric 18 connects the respective PSTN lines together in the conventional conference call format at step 44.

[0031] Alternatively, at step 42 the host caller may contact the intelligent peripheral either via one of the telephones 12, by dialling the appropriate "800" telephone number, or via access through the Internet 30 to the IP web server 26. In this situation, the intelligent peripheral requests the host caller to enter a passcode that was assigned to the call during the pre-registration process. This passcode is forwarded to voice peripheral processor 24 which retrieves the pre-registration information from memory and uses that information to establish the conference call.

[0032] It is also understood that a participant also may join the conference call via an audio connection through the Internet 30. In this case, the person accesses the intelligent peripheral 14 via a personal computer 32 connected through the Internet 30 to the IP web server 26. The person then selects the hyperlink displayed on the web server's home page for joining a conference call and the personal computer 32 accessing the web server 26 will then receive a query to enter the pass code for the call to be joined. Thereafter, a voice path is established by the ATM switch 16 between the switching fabric 18 which handles the telephone calls of the conference and the web server 26. A participant connected via the Internet 30 is treated in the same manner as a call participant via the telephone and the PSTN 10. Such an Internet connection will have a specified billing rate per interval of connect time (e.g. $0.50 US per minute).

[0033] In order to monitor the status of the conference call in real-time, the host caller or anyone else can access the intelligent peripheral 14 via the Internet and web server 26. Upon selecting a hyperlink for call monitoring on the web server home page, the accessing personal computer 32 or 33 receives a query to enter the pass code for the call to be monitored. In response to receiving a valid pass code, the intelligent peripheral 14 begins sending the conference call status information to that personal computer 32 or 33 for the web browser to display.

[0034] As the telephone lines forming the conference legs are connected, the status (connected or disconnected) of each leg of the conference call is sent by the voice peripheral processor 24 through the ATM switch 16 to the web server 26 where the call status is formatted into display data and sent over the Internet to the host caller's computer 32. This enables the host caller to monitor the call status and know when each participant has joined the conference.

[0035] When all of the participants who have answered the calls from the call processor 20 have been interconnected by the switching fabric 18, the conference call processing program advances to step 46. It is understood that when one or more of the designated participants does not answer the initiating telephone call, the conference application will periodically place the call again in an attempt to reach that participant and connect him or her into the conference. At step 46, the voice peripheral processor 24 monitors the conference call to determine whether any of the participants has dropped out of the conference, i.e. hung up the phone.

[0036] As a billing increment of time elapses (e.g. every X seconds, where X is a positive number) for each leg of the conference call, the charge amount for that leg is increased by the per increment toll charge thereby producing a running subtotal for each leg of the conference call. In addition, the running subtotals for each leg are summed to produce a cumulative total for the entire conference call. It should be understood that because each leg was connected at slightly different times the billing periods will be different.

[0037] Each time one of the running subtotals for a conference leg is increased, the new charge amounts are sent from voice peripheral processor 24 through the ATM switch 16 to the web server 26. The web server 26 places the new charge information into a data packet which is transmitted via the Internet 30 at step 48 to the host caller's computer 32 where the amounts are displayed. This provides real-time cost data to the host caller which indicates the running subtotal for each leg of the conference call and the total amount for the call.

[0038] When a participant drops out of the conference call, the disconnect status is indicated to the host caller via the Internet connection. The running subtotal charge for that leg of the conference stops being incremented, but the final subtotal amount continues to be added into the cumulative total for the conference.

[0039] After sending updated data on the status and charges of the conference call, the voice peripheral processor 24 determines at step 50 whether the cumulative total has exceeded a dollar limit for the conference call which was established during the pre-registration (at step 40). This dollar limit function may or may not be implemented by the host caller. Until the call limit is exceeded, the real-time billing procedure advances to step 52 where a determination is made whether the call is finished. If not, the process returns to step 46 so that

the call processor can continue to monitor the conference.

[0040] When the cumulative charge of the call is found at step 50 to exceed the established call limit, the process branches to step 54 where the voice peripheral processor 24 instructs call processor 20 to terminate all of the conference call connections in the switching fabric 18. In practice, the voice peripheral processor 24 may be configured to detect when the cumulative charge for the call is approaching the call limit, i.e. the cumulative charge reaching a pre-defined dollar amount below the call limit. At that time the voice peripheral processor 24 sends an audio message via the switching fabric 18 to the conference participants alerting them that the call is approaching the dollar limit. A further enhancement of the present technique allows the host caller at this time to increase the dollar limit via the personal computer Internet connection, thereby allowing the call to continue beyond the previously defined termination point.

[0041] Eventually when either all of the participants have hung up or termination occurs at step 54, completion of the conference call is detected at step 52 and the billing procedure advances to step 56. At this time the voice peripheral processor 24 sends the final cumulative charge to the billing server 22 along with other information regarding the conference call connection as outlined above. This data enables the billing server 22 to prepare and send a data packet to the billing computer system 28 of the network service provider so that the conference call charge will appear on the next statement of the host caller. At the same time, the cumulative cost information is sent to the web server 26 which then at step 58 sends the final call information via the Internet to the host caller's web browser on computer 32 and to the web browsers on any other personal computers connected to the Internet that were designated in the pre-registration information. The billing process then terminates.

[0042] As an alternative to the billing server 22 forwarding information about the conference call to the network provider's billing computer system 28, the intelligent peripheral 14 may send a transactional message via the web server 26 and the Internet 30 to a credit card account, debit account or an electronic commerce system maintained by a third party. Such third-party billing provides faster payment to the network provider than relying upon the provider's normal billing cycle and customer payment periods.

[0043] Finally, it will be appreciated that although the preferred embodiment has been described in relation to the conventional Internet, other networks which support the Internet protocol (intranets, extranets, etc) could also be used to connect a user device to the intelligent peripheral.

Claims

1. A method of monitoring charges for a service provided by a communication network comprising the steps of:

   detecting occurrences of billing events which occur during use of the service;

   when a billing event occurs, adding a charge fee associated with the event to a cumulative charge total for the service;

   occasionally transmitting the cumulative charge total via the Internet (30) to a device (32) located with a person using the service; and

   displaying the cumulative charge total received from the Internet to the person while the service is being used.

2. The method of claim 1 further comprising:

   storing a limit on the total charge for the service as defined by a user of the service; and

   terminating further use of the service when the cumulative charge total reaches the limit on the total charge.

3. The method of claim 1 or 2 further comprising, at the completion of a usage of the service, a provider of the communication network sending the cumulative charge total to one of a credit card account, a debit account or an electronic commerce system which is operated by other than the network provider.

4. The method of any preceding claim, wherein the step of detecting occurrences of billing events comprises detecting each time a predetermined period of time elapses during use of the service.

5. The method of claim 4 wherein the service is a conference call service, and the step of adding a charge fee comprises, for each communication line connected to a conference call, adding the charge fee associated with a given communication line to the cumulative charge total every X seconds while that given communication line is connected to the conference call, where X is a positive number.

6. The method of claim 4 wherein the service is a conference call service which interconnects several communication lines, and the step of adding a charge fee comprises adding a charge fee associated with a given communication line to a running

subtotal for that given communication line every X seconds while that given communication line is connected to a conference call, where X is a positive number; and producing the cumulative charge total by a summation of the subtotal for each communication line.

7. The method of claim 6 further comprising:

transmitting the subtotal for each communication line via the Internet to the device located with a person using the service; and

displaying the subtotal for each communication line to the person while the service is being used.

8. The method of any preceding claim wherein the service provides a conference call involving a plurality of participants, and further comprising:

periodically transmitting, via the Internet to the device located with a person using the service, an indication of whether each participant is connected to the conference call; and

displaying each indication to the person while the service is being used.

9. The method of claim 1, wherein said service is a conference call involving an interconnection of a plurality of communication lines and said person using the service is a participant in the conference call, and wherein said adding step comprises, for each communication line in response to an occurrence of a predefined billing event while that communication line is connected to the conference call, adding a charge fee associated with the billing event to a cumulative charge total for the conference call.

10. A system for monitoring charges for a service provided by a communication network comprising:

means for detecting occurrences of billing events which occur during use of the service;

means responsive to a billing event for adding a charge fee associated with the event to a cumulative charge total for the service;

means for transmitting the cumulative charge total via the Internet (30) to a device (32) located with a person using the service; and

means for displaying the cumulative charge total received from the Internet to the person while the service is being used.

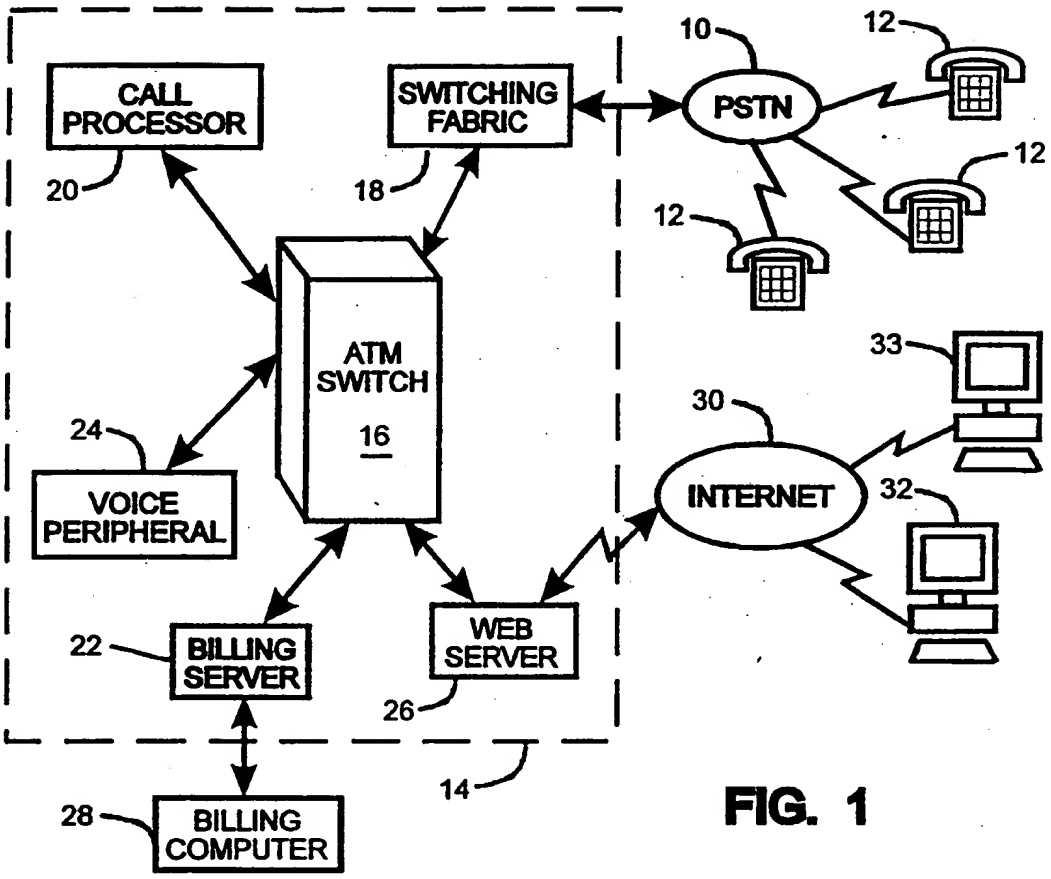
CALL PROCESSOR
20
SWITCHING FABRIC
18
ATM SWITCH
16
VOICE PERIPHERAL
24
BILLING SERVER
22
WEB SERVER
26
BILLING COMPUTER
28
14
10
PSTN
12
12
12
30
INTERNET
33
32

FIG. 1

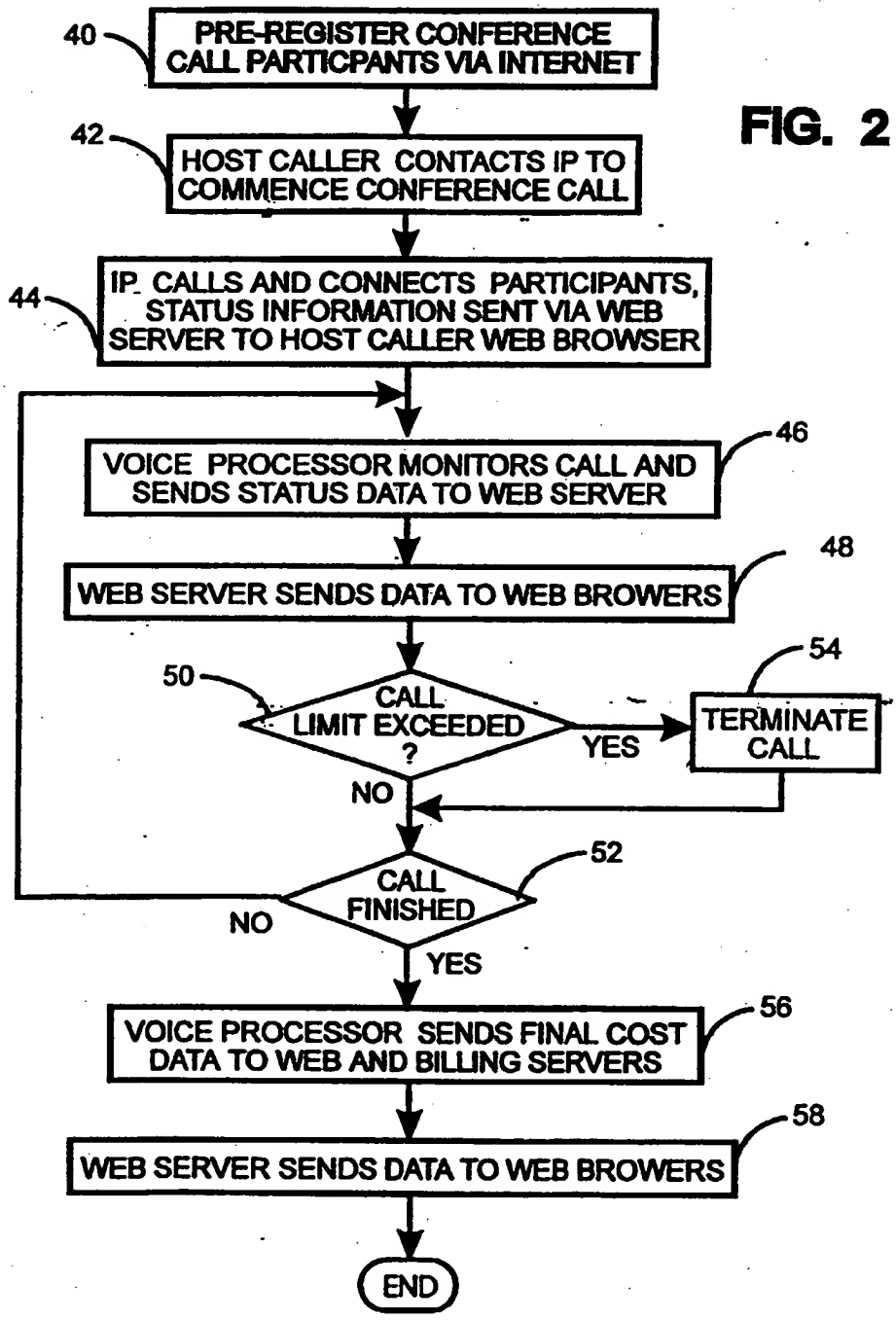
40
PRE-REGISTER CONFERENCE CALL PARTICPANTS VIA INTERNET
42
HOST CALLER CONTACTS IP TO COMMENCE CONFERENCE CALL
44
IP CALLS AND CONNECTS PARTICIPANTS, STATUS INFORMATION SENT VIA WEB SERVER TO HOST CALLER WEB BROWSER
46
VOICE PROCESSOR MONITORS CALL AND SENDS STATUS DATA TO WEB SERVER
48
WEB SERVER SENDS DATA TO WEB BROWERS
50
CALL LIMIT EXCEEDED ?
YES
54
TERMINATE CALL
NO
52
CALL FINISHED
NO
YES
56
VOICE PROCESSOR SENDS FINAL COST DATA TO WEB AND BILLING SERVERS
58
WEB SERVER SENDS DATA TO WEB BROWERS
END

FIG. 2

> space and the remaining plurality of users may access the virtual space without charge.

Claims 25 and 31 recite similar features.

In the outstanding Office Action Claim 1 was rejected under 35 U.S.C. §103(a) as being unpatentable over de Groot in view of Carrott and Kawamura. The outstanding Office Action, states that "De Groot however is silent regarding a charge controlling means for charging said privileged user who owns said user-specific virtual space and only the first or privileged user is charged to access the virtual space."

However, the outstanding Office Action relies on Carrott as curing the above noted deficiency in de Groot. The Advisory Action mailed September 20, 2006 states, "The option to charge a distribution fee in Carrott meets claim limitations. Remaining arguments exceed scope of claims."

In response Claims 1, 25 and 31 are amended to more clearly recite that it is only the first user of a plurality of users that is charged to access the user-specific virtual space and the remaining plurality of users may access the virtual space without charge.

Carrott describes a method of allocating commissions for sales made over the internet. Col 7, line 66 of Carrott recites "the invention may choose not to charge a distribution fee." The context of Col. 7, line 66 is that certain physical geographic areas such as the United States are split up into smaller defined exclusive areas (DEAs) such as the American Southwest or California. The right to have customers from a certain DEAs be redirected to your website can be purchased so that customers not visitors are directed to the user's website.[1] However, Carrott does not describe or suggest that only said first user of a plurality of users is charged to access said user-specific virtual space.

In other words, Carrott says nothing about only the first user of a plurality of users being charged and the remaining plurality of users may access the virtual space without

[1] Col. 5 lines 63-64.

charge. Further, Carrott says nothing about charging to access a user-specific virtual space. In Carrott the DEA's are real non-virtual geographic areas such as Zip codes or population centers[2] not virtual spaces. Clearly Carrott does not describe or suggest that only said first user is charged to access said user-specific virtual space, as is recited in Claim 1.

Further the outstanding Office Action states that "the above combination [de Groot and Carrott] is silent regarding the feature of "specifying a plurality of types of virtual spaces to be offered for selection.""

However, the outstanding Office Action relies on Kawamura as curing the above noted deficiencies in de Groot and Carrott.

However, Kawamura merely describes a virtual space data file that includes geographical and image data corresponding to a two-dimensional section organized by x and y coordinates.[3] Kawamura does not describe specifying a plurality of types of virtual spaces to be offered for purchase, such as a large three dimensional room[4] or a room that allows certain number of decorated items.[5] Thus, Kawamura's virtual space feature is not descriptive of Claim 1's virtual space information storing means for storing, in advance, virtual space information specifying a plurality of types of virtual spaces to be offered for purchase, as it does not describe or suggest offering different types of virtual space for purchase.

Further, Kawamura does not cure the deficiencies of de Groot and Carrott with respect to the above noted features of Claims 1, 25 and 31.

Additionally the further cited Leahy does not cure the deficiencies of de Groot, Carrott and Kawamura with respect to the above noted features of Claims 1, 25 and 31.

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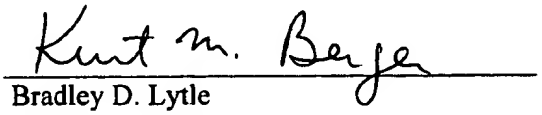
[2] Col. 7, lines 27-37.
[3] Kawamura et al. Col. 5, lines 46-53.
[4] Specification page 36.
[5] Specification page 37.

Accordingly, for the above reasons, Applicant respectfully requests that the rejection of Claims 1-8, 25, 26, and 31 under 35 U.S.C. 103(a) as unpatentable over de Groot in view of Carrott and Kawamura be withdrawn; and respectfully submits that Claims 1-8, 25, 26, and 31 are patentable over de Groot, Carrott, Kawamura and Leahy considered individually or in any proper combination.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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